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The relation between BPM culture, BPM methods, and process performance: Evidence from quantitative field studies

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Abstract

Business process management (BPM) research conceptualizes BPM culture as a type of organizational culture that supports BPM. No quantitative fieldwork has so far examined how such a supporting role manifests itself. We study the relationship between BPM culture, BPM methods, and process performance empirically. Our analysis of multiple survey data sets from a total of 581 practitioners of multiple industries suggests that BPM methods indirectly contribute to process performance by establishing a BPM culture. This finding updates the prevalent assumption that the correct application of methods yields direct performance benefits. We discuss several implications for theory and practice.

Keywords

Business Process Management, BPM Methods, Organizational Culture, Process Performance, Survey

Introduction

To establish efficient and effective processes, many organizations use a variety of business process management (BPM) methods, i.e., techniques that help document, analyze, and improve organizational business processes, such as six sigma, business process model and notation, or lean management (Kettinger, Teng, & Guha, 1997; Turetken & Demirors, 2011). Although BPM methods are considered essential for increasing process performance (Gartner, 2014), many BPM projects still fail and are accompanied by organizational disadvantages despite applying respective methods (Holterman, 2013).

One of the main reasons for failed applications of BPM methods has been reported to be the factor *culture* (Donaldson, 2001; Savvas, 2005). The typical argument goes that cultural values and beliefs that are opposite to beliefs underpinning BPM cannot provide a fertile ground on which methods can effectively be used and yield expected results (Khazanchi, Lewis, & Boyer, 2007). Congruent with this argument, studies typically report on culture as a *given phenomenon* that constrains the implementation of methods and determines organizational performance (Baird, Hu, & Reeve, 2011; Barney, 1986; Iivari & Huisman, 2007; Ruževičius, Klimas, & Veleckaitė, 2012).

More recently, research has emerged that offers a contrasting argument and conceptualizes the notion of BPM culture as a type of organizational culture supportive of BPM (Schmiedel, vom Brocke, & Recker, 2014). In this line of argumentation, organizational culture is not viewed as a given phenomenon and constraint for method implementations, but instead as a factor that can consciously be shaped as a resource for performance gains (Weber & Dacin, 2011). That is, this view entails that organizations can actively design their culture to embrace values supporting BPM, which, in turn, strengthens the performance of business processes.

At face value, both lines of argumentation seem to have some merit and validity. Both clearly acknowledge culture to be an important BPM success factor, yet they differ in the relative importance and influence of the role of culture. To resolve these contradicting views, precise and quantifiable empirical research is needed, which has been absent to date. We take this step and statistically examine the position and role of the BPM culture construct in the relation between BPM methods and process performance.

We base our study on the morphogenetic perspective on culture (Archer, 1996), which suggests that culture may not just be a given condition that determines agency (viz., given organizational cultures may foster behavior that ultimately leads to project failure) but also a product of repeated agency (viz., the implementation of methods requires new behaviors that reshape the existing culture through constant repetition) (Bauman, 1999; Giddens, 1979). In our study, we explore how far this dualist perspective in culture analysis (Archer, 1996) can be used to explain the relation between *BPM methods*, *BPM culture*, and *process performance*. We examine multiple survey data sets from BPM practitioners across various organizations and industries to study this linkage.

Our empirical results suggest that BPM culture takes a mediating role in the method–performance relation: BPM culture is influenced by BPM methods and influences process performance in turn. In other words, our findings suggest that the application of BPM methods indirectly contributes to process performance by the establishment of a culture that supports BPM. We believe that these findings, while valuable in their own right for BPM research, also have interesting implications for information systems (IS) research. Although past studies of IT-enabled initiatives, such as process standardization, process outsourcing, or virtual collaboration (Majchrzak, Rice, Malhotra, & Ba, 2000; Mani, Barua, & Whinston, 2010; Venkatesh & Bala, 2012), have not focused on culture in explaining performance increases, our findings suggest that cultural requirements may play a more fundamental role than currently assumed in settings where information technology (IT) is integrated into business processes.

We proceed as follows. First, we provide background on our research before developing arguments on the relations of the key concepts of our study and deriving respective research hypotheses. We, then, provide details about the empirical study we conducted. We present the results of our data analysis, and we discuss implications for research and practice as well as limitations of our work. We conclude the paper with a summary and outlook.

Background

BPM culture as a specific type of organizational culture

A widely recognized and established understanding of culture refers to values that are shared among the members of a cultural group (Giorgi, Lockwood, & Glynn, 2015; Parsons & Shils, 1951; Schein, 2004). Accordingly, organizational culture focuses on values that are shared by the employees of an organization. Organizational cultural values can be manifold (e.g., involvement, aggression, and job orientation) (Leidner & Kayworth, 2006), yet not all values may be equally relevant to studying BPM and IS phenomena.

Our research focuses on organizational values that prior research identified to be essential elements of a so-called BPM culture (Schmiedel, vom Brocke, & Recker, 2013). BPM culture refers to a specific type of organizational culture that embraces a set of values that support the achievement of BPM objectives (Armistead, Pritchard, & Machin, 1999; Hammer, 2007; Jesus, Macieira, Karrer, & Caulliraux, 2010; Schmiedel et al., 2013; Zairi, 1997). Prior research has specified four particular values in terms of two subdimensions each (Schmiedel et al., 2013, 2014), as summarized in Table 1. These values are also referred to as the CERT values based on their acronym (Schmiedel et al., 2013). We explain them briefly, in turn.

The value of *customer orientation* is essential to BPM considering that *every* business processes has an internal or external customer (Hammer, 2007; Harmon, 2007). Similarly, the value of cross-functional *teamwork* is key to BPM as business processes cut *across* departments and combine singular activities (Hammer, 2007; Harmon, 2007). Further, the value of *excellence* expresses an orientation toward the fundamental BPM assumption that "every process can be made better" (Hammer, 2007; Recker, 2014). Finally, the value of *responsibility* addresses the essential need for a BPM governance that builds on accountability for process performance (Hammer, 2007; Spanyi, 2010).

Table 1

Values specifying the BPM culture concept (Schmiedel et al., 2013)

Value	Customer Orientation	Excellence	Responsibility	Teamwork
	The proactive and responsive attitude toward the needs of process output recipients	The orientation toward continuous improvement and innovation to achieve superior process performance	The commitment to process objectives and the accountability for process decisions	The positive attitude toward cross-functional collaboration
Subdimensions	external customer orientation	continuous process improvement	accountability for process objectives	formal cross-functional teamwork
	internal customer orientation	process innovation	commitment to process objectives	informal cross-functional teamwork

Organizational culture and its relation to management practices

Research on how culture relates to management practices in general has typically focused on culture as a *determinant* of management (cf. Kellogg, 2011; Weber & Dacin, 2011). The same deterministic view is prevalent in both the BPM and IS literature specifically (e.g., Davenport, 1993; Ruževičius et al., 2012). Literature in these fields typically assumes culture to be an independent variable that influences process and change management methods (Guha, Grover, Kettinger, & Teng, 1997; Kettinger & Grover, 1995; Kettinger et al., 1997; Zucchi & Edwards, 1999), even in settings that cover cultural aspects of IT-mediated process phenomena such as global virtual teams, ERP implementation, or IT outsourcing (Lacity, Khan, & Willcocks, 2009; Shachaf, 2008; Soh, Kien, & Tay-Yap, 2000). Furthermore, research in the IS literature often focuses on culture as a moderating variable that determines other variable relations. For example, Bradley et al. (2006) find that organizational culture influences the relation between planning practices and IS success.

By contrast, few studies consider culture as a dependent variable and study management practices as their determinant (Canato, Ravasi, & Phillips, 2013; Giorgi et al., 2015; Howard-Grenville, Golden-Biddle, Irwin, & Mao, 2011; Smets, Morris, & Greenwood, 2012). A recent review of culture in IS research also shows a similar neglect of culture as a dependent variable (Kummer & Schmiedel, 2016).

In the BPM literature, the situation is similar: While BPM research has exemplarily shown how business process reengineering methods might influence organizational culture (Huq, Huq, & Cutright, 2006; Sarker & Lee, 2002; Stoddard & Jarvenpaa, 1995; Žabajek, Kovačič, & Štemberger, 2009), summative literature reviews show only few studies on culture as a dependent factor (vom Brocke & Sinnl, 2011). Yet, studying organizational culture, and particularly BPM culture, as a mediator would allow gaining insights into what reshapes culture toward a BPM culture and what the consequences of such reshaping are. Specifically, our thesis is that a deeper understanding of the role of BPM culture in applying BPM methods can help to address performance issues in BPM and IS practices (Holterman, 2013).

A morphogenetic perspective of culture

The morphogenetic perspective builds on the dialectic between *structure* (i.e., given settings that determine action possibilities) and *agency* (i.e., autonomous actions that determine structural characteristics) to explain changes in social systems (Archer, 1996, 2010). Cultural morphogenesis is used to study the dialectic between *culture* and *agency* (Archer, 1996; Giddens, 1979; Porpora, 2013). Specifically, cultural morphogenesis represents a perspective that analyzes culture and action separately to understand how they influence each other; this approach is called *analytical dualism* (Archer, 1996; Zeuner, 2003).

On the one hand, the dualistic approach examines the effect of given cultural conditions on agency; on the other hand, it analyzes how far agency reproduces or transforms cultural conditions (Archer, 1996). Specifically, as culture engenders the *replication* of given structures, and it also initiates actions for the *transformation* of structures, the morphogenetic perspective examines culture both as an independent factor and a dependent factor (Archer, 1996). This analytical dualism suggests that culture might assume the role of a *mediating variable*. In line with this view, our aim is to empirically explore and measure whether indeed BPM culture can be conceived as mediating the relationship between method and performance variables.

Hypothesis development

Following the morphogenetic understanding of culture (Archer, 1996) allows us to study the mediating role of culture in a BPM context from two perspectives: as an independent variable and a dependent variable. Figure 1 shows our research model. Its main thesis is that the role of BPM culture is best conceptualized as a full mediator in the relation between BPM methods and process performance.

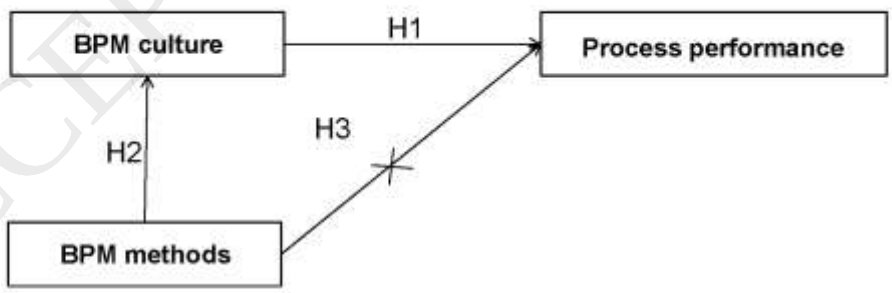

Figure 1 Research model

Adopting a morphogenetic understanding of culture means that BPM culture should be examined from two vantage points: as a source of structural *replication* and as a source of structural *transformation*.

Considering culture as a source of structural *replication* suggests a basic linkage: BPM culture as a given condition that determines agency should have a positive effect on process performance (Tang, Pee, & Iijima, 2013). BPM culture denotes a cultural environment that embraces the four values: customer orientation, excellence, responsibility, and (cross-functional) teamwork (Schmiedel et al., 2013), all of which on their own have been shown to be key antecedents to performance. Studies found, for example, that *customer orientation* positively influences the overall performance of small- and medium-sized enterprises (Appiah-Adu & Singh, 1998) and that it also has a positive effect on how customers evaluate service performances of employees (Brady & Cronin Jr., 2001). Further studies suggested that innovation and continuous improvement (i.e., the core elements of the BPM culture value *excellence*) are important means to increase performance in manufacturing companies (Terziovski, 2002). Similarly, research identified commitment (i.e., a core element of the BPM culture value *responsibility*) to be a key determinant of job performance (Suliman & Iles, 2000). Finally, prior research also suggested that better *teamwork* (measured based on skills and behaviors) leads to better performance in emergency simulations (Siassakos et al., 2011).

Along these lines, we expect that BPM culture will have a positive association with the performance of organizational processes. BPM culture values describe a conception of the desirable, i.e., what is felt or thought proper to want (Kluckhohn, 1951). They signify espoused beliefs identifying what is important to the work group (Leidner & Kayworth, 2006) and manifest themselves in observable actions and structures such as behavioral (e.g., manners and rituals) and structural (e.g., physical environment and technology) patterns that comply with the cognitive schemas that represent the value-inherent assumptions about “what is important.” For example, the BPM culture value *customer orientation* reflects a belief that responsiveness to internal and external customers’ needs is important, while *excellence* describes an orientation toward optimality through discipline, quality awareness, and sustainability. Both values highlight a shared belief in the relevance of doing a job “as good as possible” and a focus on learning and development. The values *responsibility* and *teamwork* describe an orientation toward understanding why a person’s job is important in the context of the team (Zhang & Bartol, 2010) and fortifying a person’s sense of competency and control over their place in the team (Spreitzer, 1995). If individuals believe their roles and tasks are meaningful (e.g., by being customer-oriented) and that they act self-driven (e.g., responsible), they will strive to do the job as good as possible (excellent) (Spreitzer & Doneson, 2005). Along this line of argumentation, we thus expect that, generally, BPM culture should lead to an increased type of agency that fosters the performance of business processes:

H 1. High levels of BPM culture presence will be associated with high levels of process performance in an organization.

The second vantage point is to consider culture as a source of structural *transformation*.

Extant BPM and IS research has widely recognized the need for change management in IT-enabled BPM projects (Harmon, 2003; Willcocks & Smith, 1995) but tends to consider culture as a given structure that determines individual behavior (Kettinger & Grover, 1995) rather than a factor that can be designed or influenced (Kummer & Schmiedel, 2016). In other words, research on the other side of the coin—culture as a dependent variable—seems underrepresented. Following the logic of agency as a source of cultural transformation (Archer, 1996), however, we would expect that the application of BPM methods corresponds to establishing and fortifying new agencies that, in turn, lead to a cultural transformation because they enforce new behavioral patterns that foster the internalization of cultural values underlying the BPM methods that were adopted.

To understand the logic of this argument, consider exemplary BPM methods. For example, measuring process performance as performed in Six Sigma is a key technique of BPM, which requires that somebody—typically the process owner—regularly evaluates performance indicators (e.g., the current or desired Sigma level) and initiates potentially required change initiatives as a measure of continuous improvement (Snee & Hoerl, 2003). Thus, the technique requires the ascription of *responsibility*, which is an essential value of a BPM culture, and it also stimulates a continuous and persistent strive for *excellence*, which again is a core value of a BPM culture. It is likely that these values are increasingly fostered through consistent method application (e.g., by reiterating the DMAIC cycle in Six Sigma, Savolainen & Haikonen, 2007) because methods provide externalized norms and schemas that people refer to and abide by. Over time, people internalize these norms and schemas and they become part of "the way we do things," that is, the dominant working culture. Because BPM methods are set up to foster norms and schemas related, for example, to the improvement and innovation of cross-departmental processes, they should naturally lead to a "process-oriented" culture. Thus, we argue that higher levels of regular BPM method usage should be helpful in establishing a BPM culture. We expect:

H 2. High levels of BPM method usage will be associated with a high presence of BPM culture in an organization.

Finally, we examine how BPM culture as a source of replication or transformation impacts on the relationship between BPM methods and process performance. The morphogenetic approach to studying culture suggests that BPM methods will not directly influence process performance but that their influence on process performance is mediated by BPM culture. This expectation may contradict most generally held assumptions regarding the impact of management methods on performance. We argue that BPM methods are a necessary but not sufficient condition for high process performance, similarly IT is a necessary condition for business value, but only sufficient if sustainably incorporated into business processes (Davenport, 1993). BPM methods introduce new agencies that can only facilitate efficient and effective processes *if* they are sustainably incorporated in the organization's way of doing things, that is, if the norms, procedural models, and techniques provided as external schemas in the BPM methods (e.g., through modeling guidelines, templates for process analytics, or cheat sheets for process improvement) become internalized into the cognitive and behavioral schemas of the process analysts and owners engaging in BPM. We thus argue that BPM culture functions as an intermediary between BPM methods and process performance because BPM culture represents the required structure for sustaining method-driven behavior that facilitates process performance. In other terms, BPM methods foster the development of a structure that, when reinforced, amplifies what the methods set out to do. This way, all method prescriptions become internalized. Method prescriptions are then no longer required and the cultural "ways of working" determine behavior and, thus, also process performance. We therefore expect:

H 3. The presence of BPM culture will fully mediate the linkage between the usage of BPM methods and the performance of processes in an organization.

Method

Design and sampling

We chose a cross-sectional survey design because we sought insights from a broad range of practitioner and industry perspectives, and we wanted to ascertain whether generally, across a variety of processes, organizations, and sectors, there is evidence to support the conceptualization of BPM culture as a mediator between method application and process performance.

We collected two data sets: one cross-sectional and another with responses from practitioners from three particular companies. In total, our study includes responses from 581 practitioners. Table 2 provides an overview on the background of the companies. Table 3 summarizes the background of the participants in each data set. We proceeded in sequence: we first gathered and examined the cross-sectional data set (which is explained below) including controls on industry, firm size, and internationality. Because within this data set we found that survey responses from five industries (automotive, communications & media, engineering & construction, logistics & transportation, and public services) were particularly interesting, we approached organizations in these sectors and were able to collect additional in-depth company data from three of these industries.

Table 2

Background of companies represented in the study data sets

	N	**Industry**		**Number of employees**		**Turnover [million €]**		**Number of countries with company sites**	
Cross-sectional data		*7.2%*[1]	*Automotive*						
		18.6%	*Banking & financial services*	*26.8%*	*1-250*	*29.1%*	*<50*	*33.1%*	*1*
		6.8%	*Communications & media*						
		10.2%	*Consultancy*	*28.7%*	*251-1000*	*32.6%*	*50-1,000*		
	264	*6.4%*	*Consumer goods*					*38.1%*	*2-5*
		15.2%	*Engineering & construction*						
		21.2%	*Information technology*	*25.3%*	*1001-10,000*	*19.6%*	*1,000-10,000*		
		6.4%	*Logistics & transportation*	*19.2%*	*>10,000*	*18.7%*	*>10,000*	*28.8%*	*>5*
		8.0%	*Public services*						
Automotive company	104		Automotive	9000		2,000		11	
Engineering company	52		Engineering & construction	150		50		1	
Logistics company	161		Logistics & transportation	27,000		5,000		18	

[1]percentages exclude nonresponses

Cross-sectional data. Our cross-sectional data set includes 264 survey participants working in the field of BPM. We invited company representatives experienced in BPM through professional social media platforms, online forums, and professional networks (e.g., LinkedIn, BPTrends, and SAP Business Transformation Services) to participate in our online survey. We used an online survey because of the many advantages of this mode of data collection (Bhattacherjee, 2001), particularly so as to include a broad audience of BPM practitioners working in various processes and positions, such as process analyst, process manager, or process consultant. This guaranteed that participants of our study could relate to specific BPM methods and general process terminology, and at the same time, we would have a reasonable level of variance in application of BPM methods, in establishment of BPM culture, and in achievement of process performance, which was necessary for our goals.

Table 3

Background of survey participants in the study data sets

	Cross-sectional data	Automotive company	Engineering company	Logistics company
Position	45.6% operational 22.1% managerial 32.3% executive	66.3% operational 24.0% managerial 9.6% executive	65.4% operational 9.6% managerial 25.0% executive	42.2% operational 30.4% managerial 27.3% executive
Process	29.9% core 33.6% support 36.5% management	53.5% core 13.9% support 32.7% management	70.6% core 25.5% support 3.9% management	69.1% core 20.1% support 10.7% management

Company data. Our company data sets include in total 317 survey participants from three globally working corporations performing BPM in the automotive, engineering & construction, and logistics & transportation industries. All three corporations are headquartered in central Europe. We knew that over the past years, all three actively engaged in corporate projects that help to manage their business processes. For data collection, we distributed the invitation to the survey instrument through contact persons in the companies who sent out the information internally by e-mail to those practitioners from the three organizations that were in BPM-relevant positions; for example process owners, process managers, or process participants. This ensured response validity because the survey participants were not only familiar with process terminology but also knowledgeable about processes within their organizations.

In all data sets, respondents' positions ranged from operational to managerial to executive (Table 3). Participating employees were located in departments covering organizational core processes (e.g., research & development, production, and logistics), support processes (e.g., IT, human resources, and accounting & finance), and management processes. Most participants were employed for more than five years, indicating that sufficiently detailed knowledge on the organization and its culture were available.

Measurement of BPM culture

To measure presence of *BPM culture*, that is, an organizational culture supportive of BPM (Armistead et al., 1999; Hammer, 2007; Jesus et al., 2010; Zairi, 1997), we used a validated reflective-formative hierarchical measurement model based on four cultural value constructs with two subconstructs for each value (Schmiedel et al., 2014) (Table 4). Each subconstruct is measured with five items, which adds up to 40 items for the measurement of the BPM culture construct (see Appendix A for the full instrument).

Table 4

Value dimensions of the BPM culture construct (Schmiedel et al., 2014)

Construct	**Customer Orientation [C]**	**Excellence [E]**	**Responsibility [R]**	**Teamwork [T]**
Subconstructs	external perspective [C_e]	continuous improvement [E_ci]	accountability [R_a]	formal structures [T_f]
	internal perspective [C_i]	innovation [E_i]	commitment [R_c]	informal structures [T_i]

Measurement of BPM methods

To measure usage of BPM methods, we developed new measurement items that capture the application of general BPM methods [M]. As BPM methods refer to techniques that help manage organizational processes, we considered the construct a composite of specific components (Edwards & Bagozzi, 2000) and, thus, developed a formative measurement instrument.

Following extant recommendations for index construction with formative indicators (Diamantopoulos & Winklhofer, 2001), we first specified the content of the BPM methods construct because a formative index is determined by its indicators and neglecting facets of the construct leads to an exclusion of pertinent indicators (Diamantopoulos & Winklhofer, 2001; Nunnally & Bernstein, 1994). We specified the scope of the latent variable as comprising of methods at the *strategic*, *tactic*, and *operational* level, a differentiation that is broadly established in both academic literature and industry (Indulska, Chong, Bandara, Sadiq, & Rosemann, 2006).

Methods at the *operational* level refer to those techniques that support short-term decisions regarding the regular execution of business processes (Rouwenhorst et al., 2000). They are particularly relevant for monitoring and controlling purposes (Indulska et al., 2006) and include, for example, the definition of KPIs and their monitoring in BI systems.

Methods at the *tactical* level refer to techniques that support medium-term decisions toward realizing high process performance (Rouwenhorst et al., 2000). Such techniques are highly relevant for the standardization of business processes. Process documentation, for example, represents a key method in this context, as it provides a basis for analyzing existing processes. It includes various process modeling techniques, such as BPMN or UML.

Methods at the *strategic* level refer to techniques that support long-term decisions to reach high process performance (Rouwenhorst et al., 2000). They are particularly relevant to improve and innovate processes. Methods such as Six Sigma, Lean Management, and Business Process Reengineering help identify wastes in existing processes and to implement both incremental and radical changes to improve or innovate processes.

By developing indicators to measure the BPM methods construct, we ensured that the items cover the entire scope of the index to establish content validity (Diamantopoulos & Winklhofer, 2001; Petter, Straub, & Rai, 2007). Thus, we made sure our items cover BPM methods at all three levels of the content domain, viz., that they cover the typical BPM lifecycle including measuring (operational), documenting (tactical), and changing (strategic) business processes in organizations (Dumas, La Rosa, Mendling, & Reijers, 2013). We pretested the understandability of the indicators with ten people working in the field of BPM (managers, process experts, and researchers). We asked each person individually to apply the scale to assess BPM methods in their organizations and provide us with direct feedback on the clarity of the measurement instrument. We used this input to iteratively revise the items. The final items used to measure the BPM methods construct are presented in Table 5.

Table 5

Measurement of the BPM methods construct

Construct	Level	Indicator	Item
BPM methods [M] (Techniques that help manage organizational processes)	**Operational** (Techniques that support short-term decisions regarding the regular execution of business processes)	**PM**	The extent to which your organization measures the performance of its business processes (e.g., in terms of input, output, time, and quality).
	Tactic (Techniques that support medium-term decisions toward realizing high process performance)	**PD**	The extent to which your organization documents its business processes (e.g., manuals, documents, and flowcharts).
	Strategic (Techniques that support long-term decisions to reach high process performance)	**PC**	The extent to which your organization has changed its business processes in the past years (e.g., new policies and workflows).

Measurement of process performance

Process performance, that is, the efficiency and effectiveness of organizational processes (ABPMP, 2009; Cleven, 2011; DeToro & McCabe, 1997; Hammer, 2010) is a difficult construct to operationalize because performance is an idiosyncratic concept, varying by context, process, organization, and other levels. Measuring it precisely would generally require examining specific processes as run by particular companies to identify their concrete performance metrics. Depending on the setting, such a metric might be turn-around time (as in many customer service management processes), consistency (as in many production processes), or outcome quality (as in many manufacturing processes). Aside from the difficulties in identifying the relevant metrics and relevant data, such measures would not be generalizable across companies and industries. Yet, our goal was to study how process performance relates to varying manifestations and levels of BPM culture and varying levels of BPM method use on a general, cross-sectional level. Thus, we deemed self-report measures a more appropriate proximal variable because these data are comparable across different subsamples in our data set (e.g., different organizations and different industries). The tradeoff we made was thus one in favor of external validity over internal validity.

Due to a lack of suitable measures, we developed a new instrument, following established procedures (MacKenzie, Podsakoff, & Podsakoff, 2011; Moore & Benbasat, 1991). Appendix B provides a detailed account of our procedures. Our approach included creating initial items based on the literature, selecting suitable items to measure both the efficiency and effectiveness of processes, and iteratively revising and pre-testing the items with academics and practitioners in the BPM field. This way, we developed a reflective–formative measurement instrument with ten items to assess the process performance construct. The final items used in our study are shown in Table 6.

Table 6

Measurement of the process performance construct

Construct	Subconstructs	Indicator	Item
Process performance [PP] (efficiency and effectiveness of organizational processes)	**Effectiveness [Effec]** (outcome-oriented operation of organizational processes)	**Effec1**	In the past year, our organization has achieved the desired outcomes of its business processes.
		Effec2	In the past year, our organization has been flexible in adapting its business processes to changing external requirements.
		Effec3	In the past year, the business processes of our organization have delivered output of high quality.
		Effec4	In the past year, our organization has operated its business processes in a highly goal-oriented manner.

	Effec5	In the past year, our organization has delivered the outcomes of its business processes on time.
Efficiency [Effic] (economic operation of organizational processes)	**Effic1**	In the past year, our organization has realized a desirable input–output ratio for its business processes.
	Effic2	In the past year, our organization has generated the outcomes of its business processes free from any defects.
	Effic3	In the past year, our organization has realized the outcomes of its business processes at low-cost levels.
	Effic4	In the past year, our organization has realized the outcomes of its business process in short processing times.
	Effic5	In the past year, our organization has realized the outcomes of its business processes with an economical use of resources.

Control variables

In our cross-sectional data collection, we added additional measures to be able to control for the impact of industry, firm size, and internationality on process performance (cf. Braojos, Benitez, & Llorens, 2019). First, we included the *industries* represented in our data set as dummy variables in our main model. Second, we measured *firm size* based on the number of employees. Third, we measured *internationality* as the number of countries an organization is operating in.

Results

We analyzed the data in two stages. We started with assessing nonresponse bias and common method bias. Next, we examined our data using structural equation modeling with the partial least squares technique (PLS-SEM) (Hair, Sarstedt, Pieper, & Ringle, 2012). We used the SmartPLS tool to analyze our data (Ringle, Wende, & Becker, 2015). We conducted our PLS-SEM analysis in the typical two-step approach (Hair, Hult, Ringle, & Sarstedt, 2017): we first report on the evaluation of the reflective and formative measurement models before we examine our hypotheses, that is, the relations between BPM methods, BPM culture, and process performance.

Nonresponse and common method bias evaluation

We tested for possible nonresponse bias through an independent samples t-test. We split survey responses into early and late respondents and tested for differences in key demographic and study variables (Armstrong & Overton, 1977). The t-test did not yield statistically significant mean differences between the groups. We believe nonresponse did not bias our findings.

Our research design also made the data susceptible to mono-method bias. We applied frequently employed statistical techniques to examine common method variance (Sharma, Yetton, & Crawford, 2009). Based on Harman's single-factor test and the marker-variable technique, we found no apparent bias in our data (Malhotra, Kim, & Patil, 2006).

Measurement model evaluation

We used the cross-sectional data set to evaluate our measurement model. We first examined the first-order measures and then the higher order constructs. For the evaluation of the reflective first-order measurement models, we examined the internal consistency reliability and both the convergent and discriminant validity of the construct measures.

Internal consistency reliability is traditionally evaluated with the Cronbach's alpha (CA) criterion. Table 6 shows that our results exceed the minimum threshold of 0.60, which is generally acceptable (Urbach & Ahlemann, 2010). However, the CA criterion comes along with two key limitations (Hair et al., 2017): First, it assumes that all indicators of one construct are equally reliable, having equal outer loadings. Second, CA is sensitive to the number of items used to measure one construct. To overcome these limitations, we also use an alternative measure of internal consistency reliability, i.e., composite reliability (CR) as suggested by Hair et al. (2017). Table 7 shows that all CR scores are well above the satisfactory threshold of 0.70 (Hair et al., 2017).

Table 7

Evaluation of reflective constructs I (right-hand side of the table shows construct correlations and square roots of AVE on the diagonal)

	CA	CR	AVE	C_e	C_i	E_ci	E_i	R_a	R_c	T_f	T_i	Effec	Effic
C_e	0.90	0.93	0.71	0.84									
C_i	0.93	0.94	0.77	0.63	0.88								
E_ci	0.90	0.93	0.72	0.66	0.74	0.85							
E_i	0.91	0.94	0.74	0.69	0.73	0.74	0.86						
R_a	0.88	0.91	0.68	0.63	0.64	0.70	0.67	0.82					
R_c	0.93	0.95	0.78	0.63	0.75	0.71	0.76	0.67	0.89				
T_f	0.92	0.94	0.76	0.65	0.76	0.74	0.75	0.75	0.77	0.87			
T_i	0.91	0.93	0.73	0.65	0.71	0.72	0.75	0.67	0.76	0.76	0.85		
Effec	0.93	0.94	0.77	0.63	0.68	0.74	0.67	0.70	0.73	0.73	0.66	0.88	
Effic	0.92	0.94	0.76	0.59	0.62	0.67	0.64	0.65	0.66	0.69	0.64	0.85	0.87

Convergent validity is evaluated through the indicator loadings and the average variance extracted (AVE) (Fornell & Larcker, 1981; Gefen & Straub, 2005). Appendix C shows indicator loadings for the reflective first-order constructs, all of which have associated p-values smaller than 0.001 and exceed the cut-off of 0.70, indicating satisfactory indicator reliability. Additionally, the AVE scores for the first-order constructs are above the required threshold of 0.50 (Table 7). Thus, the criteria for convergent validity are met.

Discriminant validity is evaluated through the indicator cross-loadings and the Fornell–Larcker criterion (Hair et al., 2017). The loadings of all reflective indicators on their latent constructs are above the cross-loadings on other constructs, indicating discriminant validity of the measurement scales (Appendix C). According to the Fornell–Larcker criterion, the square root of each construct's AVE should exceed the highest correlation of the construct with any other construct, which holds true for all first-order constructs (Table 7). Therefore, the criteria for discriminant validity are also met.

For the evaluation of the formative (first-order and higher order) measurement models, we examine both the relevance of the formative indicators and potential (multi-)collinearity issues.

The relevance of the formative indicators is evaluated through their absolute contribution to the respective constructs, which is specified in the indicator weights (Ringle, Sarstedt, & Straub, 2012; Wright, Campbell, Thatcher, & Roberts, 2012). Table 8 suggests to us that the M construct is explained through its formative items and that all higher order constructs related to the BPMC or PP construct are explained through respective first-order constructs.

Potential (multi-)collinearity issues are evaluated through the variance inflation factor (Hair et al., 2017). The results in Table 9 show that the VIF scores of all formative constructs are below the generally accepted cut-off of 10 (Diamantopoulos, 2011) and most also below the more restrictive cut-off of 5 (Hair et al., 2017), indicating that (multi-)collinearity is not a substantial issue in our data.

Table 8

Evaluation of reflective constructs II

Construct	Indicator	Loading	p	Construct	Indicator	Loading	p
	C_e_1	0.83	< 0.001		**C_i_1**	0.82	< 0.001
	C_e_2	0.90	< 0.001		**C_i_2**	0.88	< 0.001
C_e	**C_e_3**	0.86	< 0.001	**C_i**	**C_i_3**	0.90	< 0.001
	C_e_4	0.79	< 0.001		**C_i_4**	0.90	< 0.001
	C_e_5	0.84	< 0.001		**C_i_5**	0.88	< 0.001
	E_ci_1	0.87	< 0.001		**E_i_1**	0.83	< 0.001
	E_ci_2	0.87	< 0.001		**E_i_2**	0.80	< 0.001
E_ci	**E_ci_3**	0.83	< 0.001	**E_i**	**E_i_3**	0.92	< 0.001
	E_ci_4	0.82	< 0.001		**E_i_4**	0.93	< 0.001
	E_ci_5	0.84	< 0.001		**E_i_5**	0.82	< 0.001
	R_a_1	0.84	< 0.001		**R_c_1**	0.82	< 0.001
	R_a_2	0.77	< 0.001	**R_c**	**R_c_2**	0.90	< 0.001
R_a	**R_a_3**	0.84	< 0.001		**R_c_3**	0.92	< 0.001
	R_a_4	0.87	< 0.001		**R_c_4**	0.90	< 0.001
	R_a_5	0.81	< 0.001		**R_c_5**	0.89	< 0.001
	T_f_1	0.88	< 0.001		**T_i_1**	0.88	< 0.001
	T_f_2	0.85	< 0.001		**T_i_2**	0.86	< 0.001
T_f	**T_f_3**	0.88	< 0.001	**T_i**	**T_i_3**	0.88	< 0.001
	T_f_4	0.89	< 0.001		**T_i_4**	0.85	< 0.001
	T_f_5	0.86	< 0.001		**T_i_5**	0.79	< 0.001
	Effec1	0.88	< 0.001		**Effic1**	0.87	< 0.001
	Effec2	0.85	< 0.001		**Effic2**	0.88	< 0.001
Effec	**Effec3**	0.91	< 0.001	**Effic**	**Effic3**	0.85	< 0.001
	Effec4	0.88	< 0.001		**Effic4**	0.89	< 0.001
	Effec5	0.86	< 0.001		**Effic5**	0.89	< 0.001

For the hierarchical constructs, we additionally examine the relation between lower order and higher order constructs through the adequacy coefficient (R^2a) (Edwards, 2001; MacKenzie et al., 2011). Table 9 shows that respective R^2a scores of all higher order constructs are well above the recommended threshold of 0.50. Therefore, most of the variance in the first-order constructs is shared with the respective higher order construct.

The analysis provides evidence that the applied measurement instruments are reliable and valid. Although we only reported on the analysis of the cross-sectional data set, we also assessed the measurement models for the company data sets. The measurement models proved to be valid for all data sets.

Table 9

Evaluation of formative constructs

Construct	Indicator	Weight	p	VIF	Adequacy coefficient R^2_a
M	**PM**	0.89	< 0.001	1.60	-
	PD	0.67	< 0.001	1.47	
	PC	0.85	< 0.001	1.52	
C	**C_e**	0.52	< 0.001	1.66	0.82
	C_i	0.59	< 0.001	1.66	
E	**E_ci**	0.53	< 0.001	2.22	0.87
	E_i	0.55	< 0.001	2.22	
R	**R_a**	0.49	< 0.001	1.81	0.83
	R_c	0.60	< 0.001	1.81	
T	**T_f**	0.55	< 0.001	2.40	0.88
	T_i	0.52	< 0.001	2.40	
BPMC	**CO**	0.25	< 0.001	4.14	0.88
	E	0.27	< 0.001	5.22	
	R	0.26	< 0.001	4.89	
	T	0.28	< 0.001	5.20	
PP	**Effec**	0.52	< 0.001	4.62	0.92
	Effic	0.52	< 0.001	3.79	

Hypotheses testing

We evaluated our hypotheses in two steps. First, we examined the cross-sectional data set including all control variables. Figure 2 summarizes the results graphically. Second, because our inspection of several subsets of the cross-sectional data revealed a number of interesting findings, we then examined the additional survey data sets from three companies to assess our research model in more detail. We report on each analysis in turn.

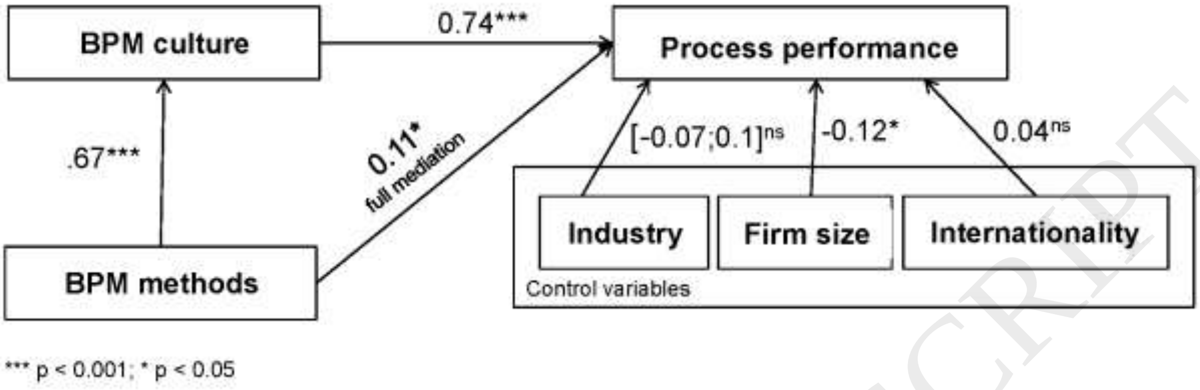

Figure 2 Structural model results with estimates from the cross-sectional data set

Examining the hypotheses *globally* in the cross-sectional data set. Assessing the validity of the construct relations included examining path coefficients, mediation, coefficients of determination, effect sizes, and analyzing potential collinearity issues among predictor constructs (Hair et al., 2017; Urbach & Ahlemann, 2010). We assessed path coefficients between the constructs in terms of their magnitude, algebraic sign, and probability *p* (Urbach & Ahlemann, 2010). We assessed these criteria for all data sets in our study (Table 10, Table 11, Table 12).

Table 10

Path coefficients

	H1: BPMC -> PP		**H2: M -> BPMC**		**H3: M -> PP**	
	Beta Coefficients	**p**	**Beta Coefficients**	**p**	**Beta Coefficients**	**p**
Cross-sectional data	0.74	< 0.001	0.67	< 0.001	0.11	0.033
Automotive	0.49	0.001	0.61	< 0.001	0.61	0.003
Banking & financial services	0.66	< 0.001	0.59	< 0.001	0.03	0.829
Communications & media	0.62	0.252	0.88	< 0.001	0.17	0.753
Consultancy	0.87	< 0.001	0.72	< 0.001	0.06	0.707
Consumer goods	0.97	< 0.001	0.77	< 0.001	-0.06	0.794

Engineering & construction	0.68	< 0.001	0.60	< 0.001	0.32	0.002
Information technology	0.62	< 0.001	0.63	< 0.001	0.06	0.627
Logistics & transportation	0.40	0.162	0.60	0.001	0.51	0.090
Public services	0.66	< 0.001	0.66	< 0.001	0.29	0.091
Automotive company	0.74	< 0.001	0.52	< 0.001	0.09	0.229
Engineering company	0.74	< 0.001	0.56	< 0.001	0.08	0.512
Logistics company	0.63	< 0.001	0.34	< 0.001	-0.02	0.797

Assessing the path coefficients of the cross-sectional data set (Table 10), we found that the path coefficients BPMC -> PP and M -> BPMC had low *p*-values, were reasonably large, and in the expected directionality. The data on the relation between M and PP might signify that BPMC does not fully mediate the linkage between M and PP in the overall cross-sectional data set, so we performed a mediation analysis to better understand how far BPM culture mediates between BPM methods and process performance (Benitez, Ray, & Henseler, 2018; Preacher & Hayes, 2004; Zhao, Lynch Jr., & Chen, 2010). We used bootstrapping to assess mediation. Specifically, we examined the indirect effect and the variance accounted for (VAF), which is the size of the indirect effect in relation to the total (= direct + indirect) effect (Hair et al., 2017). VAF values above 0.8 indicate full mediation. Table 11 summarizes the results, including the impact of control variables. It shows that in the cross-sectional data set, BPM culture fully mediates the method–performance relation.

Table 11

Mediation analysis

	Indirect effect	p	Total effect	p	VAF	Mediation	Statistical probability of controls*
Cross-sectional data	0.497	< 0.001	0.604	< 0.001	0.82	Full mediation	Industry: ns Firm size: p < 0.05 Internationality: ns
Automotive	0.298	0.015	0.910	< 0.001	0.33	Partial mediation	Firm size: 0.284 Internationality: 0.516
Banking & financial services	0.385	< 0.001	0.415	< 0.001	0.93	Full mediation	Firm size: 0.410 Internationality: 0.312
Communications & media	0.539	0.261	0.705	< 0.001	0.76	No mediation	Firm size: 0.263 Internationality: 0.673

Consultancy	0.621	< 0.001	0.684	< 0.001	0.91	Full mediation	Firm size: 0.256 Internationality: 0.264
Consumer goods	0.746	0.001	0.684	< 0.001	1.12	Full mediation	Firm size: 0.512 Internationality: 0.538
Engineering & construction	0.411	< 0.001	0.735	< 0.001	0.56	Partial mediation	Firm size: 0.489 Internationality: 0.853
Information technology	0.386	< 0.001	0.450	< 0.001	0.86	Full mediation	Firm size: 0.005 Internationality: 0.019
Logistics & transportation	0.238	0.269	0.743	< 0.001	0.32	No mediation	Firm size: 0.674 Internationality: 0.600
Public services	0.434	0.004	0.725	< 0.001	0.60	Partial mediation	Firm size: 0.621 Internationality: n/a**
Automotive company	0.389	< 0.001	0.476	< 0.001	0.82	Full mediation	
Engineering company	0.415	< 0.001	0.492	< 0.001	0.84	Full mediation	
Logistics company	0.215	< 0.001	0.197	0.011	1.09	Full mediation	

* Detailed results on the impact of control variables are provided in Appendix D.

** Responses in the public services data subset showed insufficient variance for bootstrapping regarding internationality as a control.

Examining the hypotheses *by industry* in the cross-sectional data set. Having interpreted the global results of our structural model estimation, we then examined industry-specific subsets of the cross-sectional data more in-depth to analyze how far differences between industry sectors may be present. Table 10 presents the path coefficients of all nine industries (in *italics*) represented in the cross-sectional data set. The results of the mediation analysis for each data subset (Table 11) suggest that BPMC fully mediated the M -> PP relation in four industries, whereas BPMC acted as a partial mediator in the automotive, engineering & construction, and public services industries. In the communications & media and the logistics & transportation industries, we found that BPMC did not mediate the M -> PP relation. We thus proceeded to examine additional company-specific data from three of these five industries (two of three with partial mediation results and one of two with no mediation results).

Examining the hypotheses with data from automotive, engineering & construction, and logistics & transportation companies. Assessing the path coefficients for these data sets, we found that the structural models estimated from these three data sets generally matched the global results from our cross-sectional data (Table 10). Additionally, Table 11 shows that BPMC also fully mediated the relation between BPM methods and process performance in these companies, which is at face value at odds with the cross-sectional data subset analysis. One suspected reason for this oppositional finding may be that the cross-sectional data contained relatively small sample sizes for the three industries. In the discussion section below, we return to this point in more depth.

Post-hoc analyses. We ran several additional tests to examine our data sets. First, we examined coefficients of determination and effect size. The coefficients of determination (R^2) measure the explained variance of a construct. In our study, they range between 0.12 for the BPMC construct and 0.69 for the PP construct (Table 12). Although generally high levels of R^2 indicate high levels of predictive accuracy, acceptable values depend on the construct relation complexity and the research discipline (Hair et al., 2017). As our research intends to explore relatively new phenomena in a simple model, we consider the explained variance of the constructs to be acceptable.

The effect size (f^2) measures the contribution of an exogenous construct to the R^2 value of an endogenous latent variable (Hair et al., 2017). Table 12 displays the respective f^2 values, which indicate a medium to large effect of M on BPMC, a large effect of BPMC on PP, and a negligible effect of M on PP (Urbach & Ahlemann, 2010). This finding emphasizes the importance of the mediated relation between M and PP as opposed to the direct effect of M on PP.

Table 12

Explained variance, effect size and variance inflation measures for the structural models

	R^2		**f^2**			**VIF**	
	BPMC	**PP**	**M -> BPMC**	**BPMC -> PP**	**M -> PP**	**BPMC**	**M**
Cross-sectional data	0.45	0.69	0.81	0.90	0.02	1.97	2.05

Automotive company	0.27	0.63	0.38	1.08	0.02	1.37	1.37
Engineering company	0.31	0.61	0.46	1.00	0.01	1.45	1.45
Logistics company	0.12	0.40	0.13	0.57	0.00	1.13	1.13

Second, we checked for multicollinearity through the VIF index. As the constructs BPMC and M both represent predictors of the construct PP, we evaluate their VIF scores. Our analysis shows that collinearity is not present among our constructs, as the VIF scores are well below the threshold of 10 (Table 12).

Finally, we evaluated alternative structural models (e.g., including BPM culture as a moderator or replacing BPMC and M by their subconstructs). Appendix E details the analysis including model fit evaluations. The analyses suggest that our proposed model fits the data better than the considered alternatives.

Discussion

Interpretation of results

Broadly speaking, we found our analysis of the four data sets was in line with our expectations formulated in our three hypotheses. By and large, we found our suggestion that BPM culture as a full mediator of the relation between BPM methods and process performance is befitting the data we collected. Interestingly, we found some evidence that in five industries (the automotive, the communications & media, the engineering & construction, the logistics & transportation, and the public services industries), BPM culture assumed a different role in that the construct either only partially mediated the method–performance relation or not all.

As to the partial mediation role of BPM culture in the automotive, the engineering & construction, and public services industries, our interpretation is that the application of BPM methods in these industries also directly adds to increased process performance because the adherence to respective techniques may leave no room for interpretation in contexts that follow strict operating procedures, such as in industries producing large machines and in public administration. In other industries, however, the application of BPM methods may be more subject to interpretation and, thus, may more strongly require a BPM culture to achieve performance gains.

As to the lack of mediation in the communications & media and the logistics & transportation industries, we are conscious of the fact that the comparison of the nine industries builds on very small subsamples of our cross-sectional data. In fact, the sample of the logistics & transportation industry was the smallest one with only 17 data sets, and the communications & media sample includes only 18 data sets. Therefore, the small sample size might be the reason for the "no mediation" finding.

As we intended to gain deeper insights into these industries, we studied three of them more in-depth (two that had displayed partial mediation and one that had shown no mediation) based on data from three companies in these sectors. The analysis of the company data sets showed that BPM culture was confirmed as a full mediator of the relation between BPM methods and process performance in the additional data sets. Thus, we could not verify our conjecture of industry differences. Instead, we suppose that the small sample sizes for the comparison of industries in the cross-sectional data set caused some results slightly varying from the overall trend.

The overall supported hypotheses represent the core of the theoretical contribution of our study. In fact, our study is the first to empirically investigate the relation of BPM culture with other variables. Particularly, our findings support the interpretation that the application of BPM methods indirectly contributes to process performance by the establishment of a culture that supports BPM. In other words, our findings suggest that BPM culture is not a mere context variable but rather plays an active role, which means it can be influenced and can also actively influence. Therefore, we can interpret that the execution of BPM methods might cause behavioral adaptation and adoption of practices, which may change the culture to become associative of process-friendly values such as teamwork, excellence, or customer orientation.

This interpretation of our findings may also be generalizable to other management practices beyond BPM alone. Based on our study results, we may assume that technological or managerial methods generally come along with cultural requirements. The idea that management approaches need to be culturally embedded in organizational settings to yield performance benefits also relates to research on IT business value because IT also needs to be thoroughly integrated in organizations to generate business value (Bardhan, Krishnan, & Lin, 2013; Benitez, Llorens, & Braojos, 2018). Although research on IT business value has repeatedly emphasized the importance of embedding IT into business processes (Melville, Kraemer, & Gubaxani, 2004; Trantopoulos, von Krogh, Wallin, & Woerter, 2017), we are not aware of any IT value study that relates explicitly to specific cultural requirements, such as the development of BPM culture, that would enable the integration of IT into organizational processes to realize performance benefits. However, based on our study findings, it seems obvious that this linkage can provide important insights. Future research may build on our findings in this regard. We discuss the theoretical and practical implications in detail next.

Theoretical implications

Our study contributes to research in several ways. Regarding the role of methods, our results provide evidence of some rather unexpected findings. Against generally held assumptions regarding the impact of management methods on performance, our research suggests that BPM methods not necessarily directly influence process performance. However, our results support the interpretation that applying BPM methods influences the establishment of a culture that supports BPM, which, in turn, fosters process performance. Although BPM methods require a particular form of behavior, it is key that the purpose of this behavior, i.e., the underlying values, is sustainably incorporated into structures that represent the basis for further actions (Archer, 1996). Therefore, we suggest that BPM methods are most effective if they enforce or reinforce values that function as a cultural structure facilitating process management. If, however, BPM methods are applied because they are considered to be supportive for achieving process-related goals without understanding their deeper purpose, they will not directly lead to largely increased process performance (Rosemann, 2006). Future research can build on this finding to further examine which specific BPM methods are the most effective in establishing and maintaining a BPM culture.

Regarding the role of culture, our results suggest two implications. First, our study is the first to provide empirical evidence for the relation between BPM culture and process performance. Our data suggest that BPM culture has a positive influence on the process performance of companies. This finding implies that the values of the BPM culture concept, i.e., customer orientation, excellence, responsibility, and teamwork, contribute to an efficient and effective execution of organizational processes. In other words, BPM culture and its underlying values represent a structural condition that seems to engender behavior supportive of BPM objectives. This finding ties in with research that identified organizational culture as an important factor with regard to corporate success (Barney, 1986). Future research may examine which cultural settings are the most effective for high process performance in specific contexts.

Regarding the second implication on the role of culture, our study goes beyond existing research that focuses on culture as a given structure that constrains actions. Our study also draws attention to the view that culture is a resource that can be transformed through certain actions. Specifically, our findings suggest that BPM methods might play a key role in initiating cultural change toward a BPM culture. We see two reasons supporting this interpretation: first, BPM methods create awareness to adopt process-thinking as opposed to functional thinking, and second, they require new ways of doing things, such as adopting techniques to monitor or improve processes, which lead to behavioral changes. These new agencies establish new approaches to what is right and wrong, and they implicitly suggest that new norms and values be embraced. Thus, our study particularly addresses existing calls for research to focus not only on culture as a constraint but also as a resource (Hatch, Schultz, & Skov, 2015; Weber & Dacin, 2011).

Broadly, our study contributes to research on culture as a dependent variable, which is still underrepresented in many research areas today (Leidner & Kayworth, 2006; vom Brocke & Sinnl, 2011). With the empirical evidence supporting a dependent and susceptible aspect of culture in a BPM context, our study may stimulate research on this rather neglected side of culture. Future research may focus more intensively on how organizational culture can be shaped to foster the success of BPM projects.

Further, our results support the relevance of the morphogenetic approach to studying culture in a BPM context. Analytically separating culture and agency to specify the role of BPM culture in relation to BPM methods and process performance (Archer, 1996), our study shows how the morphogenetic approach widens the research scope on culture in the BPM field beyond the predominant focus of a deterministic culture concept. Our findings represent first empirical evidence for the mediating role of BPM culture regarding the relation of methods and performance. This mediating role of BPM culture confirms the relevance of the analytical dualism approach to studying culture in a BPM context. Future research may consider a morphogenetic approach to more comprehensively study cultural phenomena.

Finally, our study also includes methodological implications. We developed new measures for the BPM methods and process performance constructs, which can serve as a basis for a multitude of further studies. Particularly, process performance represents a key variable indicative of organizational success, and the increased focus on cross-departmental processes instead of organizational functions (Davenport, 1993; Hammer, 2010) emphasizes the relevance of process performance as an indicator of organizational success. The increased focus on the concept requires an instrument that measures process performance at the organizational level. Further empirical studies examining process efficiency and effectiveness can build on the operationalization applied in our study.

Practical implications

Primarily, our study results provide empirical evidence that the application of specific BPM methods does not guarantee efficient and effective business processes. This means following certain methods (i.e., what to do) may not per se lead to benefits when method implementations neglect cultural aspects (i.e., how to do). For example, documenting organizational processes for its own sake (because it is what companies following a BPM approach do) does not necessarily lead to increased process performance. When process modeling becomes l'art pour l'art (Rosemann, 2006), the method cannot add value to the organization because it does not effectively incorporate underlying BPM-supportive cultural values into the organization. In other words, our empirical data suggest that BPM methods should not be applied for the sake of applying them.

In particular, our results caution against BPM projects that apply a specific BPM method as a universal remedy for quick performance gains instead of using the method as a means to an end to incorporate values into the organization that help increase process performance. Accordingly, management attention should focus on applying BPM methods in a way that support the establishment of a cultural environment that facilitates BPM. In general terms, BPM should help to develop habits and routines that ultimately lead to high process performance.

Additionally, the differences of the results across industries may indicate that the application of BPM methods is not always the same in different industries, as each industry also has an industry-specific culture. Therefore, organizations should consider the specific conditions of their industry when applying BPM methods, so they can ensure to actually establish a BPM culture that yields process performance gains. The same argument is presently made in research suggesting a contingency view on BPM (Zelt, Recker, Schmiedel, & vom Brocke, 2018, 2019).

Furthermore, our study can serve as a specific example for practice on how to assess both the strength of the extant cultural setting in a BPM context and the process performance in an organization. Practitioners can use our operationalization of process performance to identify potential performance gaps of their processes and to analyze how far they may be influenced by a cultural setting that does not support BPM. That means, practitioners can use the measurement instruments of our study and set up an internal survey to assess how far their culture fosters process performance.

Finally, our findings encourage to consider culture not only as a given independent variable but also a susceptible, dependent factor and, thus, manageable parameter in organizations. They provide a first understanding that culture can be shaped through BPM methods to stimulate behavior that supports process performance. Practitioners can further build on these insights to actively develop their organizational cultures to foster the efficiency and effectiveness of their business processes.

Limitations

Our study has several limitations that refer to conceptual, methodological, empirical, and analytical aspects of our research approach.

Conceptually, we limited our research model to only two predictors, thereby neglecting other determinants of process performance that have been reported, such as process goals, means to achieve these goals, or ERP system adoption (Kueng, 2000; Wieder, Booth, Matolcsy, & Ossimitz, 2006). We chose this approach because our primary ambition was to examine how BPM culture relates to method and performance variables instead of building a comprehensive and powerful explanation of process performance per se.

Methodologically, our operationalization of BPM methods only focuses on a subset of general methods in BPM, i.e., process measurement, process documentation, and process change. We selected these methods as they represent typical examples of methods at the operational, tactic, and strategic levels and are typically the most widely accepted techniques in the management of business processes. Future research may look into further BPM methods (e.g., customer requirement analysis or process simulation (Kettinger et al., 1997)) to examine our research model.

Empirically, our study builds on self-report data, which is susceptible to response bias. However, objective measures of the process performance construct, for example, are not only more challenging to obtain, but more importantly, they hardly compare across companies and industries because they would be specifically tied to the respective process content. Therefore, we decided to use perceptual measures that are comparable across contexts. We also collected and analyzed multiple data sets and obtained reasonably robust results.

Analytically, we examined data from a cross-sectional set of individual professionals plus three organizations, which are headquartered in Europe and are advanced in their BPM approach. Although the data sets Automotive company, Engineering company, and Logistics company are from three different sectors, we caution that their responses are not necessarily representative of those sectors. Further research may test our research model in other contexts and also include contingency factors as moderating variables to explain differences between process performances in various contexts. Comparative analyses with other industries or geographical regions would also allow exploring the generalizability of our findings across other cultural settings. Further, longitudinal studies may provide more detailed insights into the development of a BPM culture over time and the increase in process performance.

Conclusion

Based on our analysis of multiple data sets, we suggest that BPM culture fully mediates the influence of BPM methods on process performance. This finding represents an important contribution to the field of BPM in which researchers have largely focused on specifying technical and methodological dimensions, for example, regarding process documentation, process analytics, or process improvement. Although existing research has recognized the need to also consider social dimensions in BPM, our study is the first to examine how culture and methods *together* enhance process performance.

Specifically, our study goes beyond the dominant understanding in BPM research that considers culture as a given structure. Instead, our findings emphasize the need to apply BPM methods to incorporate those values into the organizational culture that foster performance. Thus, our study provides first empirical evidence for the importance of establishing a BPM culture to increase process performance. Research and practice can build on our study in taking up a morphogenetic view to understand which methods and which cultural settings are the most effective to sustain process performance.

References

ABPMP. (2009). *Guide to the business process management common body of knowledge*: CreateSpace Independent Publishing Platform.

Appiah-Adu, K., & Singh, S. (1998). Customer orientation and performance: A study of SMEs. *Management Decision, 36*(6), 385-394.

Archer, M. S. (1996). *Culture and agency: The place of culture in social theory*. Cambridge: University Press.

Archer, M. S. (2010). Morphogenesis versus structuration: On combining structure and action. *The British Journal of Sociology, 61*(1), 225-252.

Armistead, C., Pritchard, J.-P., & Machin, S. (1999). Strategic business process management for organisational effectiveness. *Long Range Planning, 32*(1), 96-106.

Armstrong, J. S., & Overton, T. S. (1977). Estimating Nonresponse Bias in Mail Surveys. *Journal of Marketing Research, 14*, 396-402.

Baird, K., Hu, K. J., & Reeve, R. (2011). The relationships between organizational culture, total quality management practices and operational performance. *International Journal of Operations & Production Management, 31*(7), 789-814.

Bardhan, I., Krishnan, V., & Lin, S. (2013). Business value of information technology: Testing the interaction effect of IT and R&D on Tobin's Q. *Information Systems Research, 24*(4), 1147-1161.

Barney, J. (1986). Organizational culture: Can it be a source of sustained competitive advantage? *Academy Management Review, 11*(3), 656-665.

Bauman, Z. (1999). *Culture as praxis*. London: SAGE Publications.

Benitez, J., Castillo, A., Llorens, J., & Braojos, J. (2018). IT-enabled knowledge ambidexterity and innovation performance in small U.S. firms: The moderator role of social media capabilit. *Information & Management, 55*, 131-143.

Benitez, J., Llorens, J., & Braojos, J. (2018). How information technology influences opportunity exploration and exploitation firm's capabilities. *Information & Management, 55*, 508-523.

Benitez, J., Ray, G., & Henseler, J. (2018). Impact of information technology infrastructure flexibility on mergers and acquisitions. *Management Information Systems Quarterly, 42*(1), 25-43.

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *Management Information Systems Quarterly, 25*(3), 351-370.

Bradley, R., Pridmore, J., & Byrd, T. (2006). Information systems success in the context of different corporate cultural types: An empirical investigation. *Journal of Management Information Systems, 23*(2), 267-294.

Brady, M. K., & Cronin Jr., J. J. (2001). Customer orientation: Effects on customer service perceptions and outcome behaviors. *Journal of Service Research, 3*(3), 241-251.

Braojos, J., Benitez, J., & Llorens, J. (2019). How do social commerce-IT capabilities influences firm performance? Theory and empirical eveidence. *Information & Management, 56*, 155-171.

Canato, A., Ravasi, D., & Phillips, N. (2013). Coerced practice implementation in cases of low cultural fit: Cultural change and practice adaptation during the implementation of six sigma at 3M. *Academy of Management Journal, 56*(6), 1724-1753.

Cleven, A. (2011). *Exploring patterns of business-IT alignment for the purpose of process performance measurement*. Paper presented at the 19th European Conference on Information Systems (ECIS 2011), Helsinki, Finland.

Coenen, C., von Felten, D., & Schmid, M. (2011). Managing effectiveness and efficiency through FM blueprinting. *Facilities, 29*(9/10), 422-436.

Davenport, T. (1993). *Process innovation: Reengineering work through information technology*. Boston: Harvard Business Press.

DeToro, I., & McCabe, T. (1997). How to stay flexible and elude fads. *Quality Progress, 30*(3), 55–60.

Diamantopoulos, A. (2011). Incorporating formative measures into covariance-based structural equation models. *MIS Quarterly, 35*(2), 335-358.

Diamantopoulos, A., & Winklhofer, H. M. (2001). Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research, 38*(2), 269-277.

Donaldson, L. (2001). *The contingency theory of organizations*. Thousand Oaks, London, New Delhi: Sage Publications.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2013). *Fundamentals of business process management*. Berlin, Germany: Springer.

Edwards, J. R. (2001). Multidimensional constructs in organizational behavior research: An integrative analytical framework. *Organizational Research Methods, 4*(2), 144-192.

Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods, 5*(2), 155-174.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Gartner. (2014). Fifteen skills critical to success with business process management. Retrieved from http://www.gartner.com/newsroom/id/2674619

Gefen, D., & Straub, D. W. (2005). A practical guide to factorial validity using PLS-Graph: Tutorial and annotated example. *Communications of the Association for Information Systems, 16*(5), 91-109.

Giddens, A. (1979). *Central problems in social theory: Action, structure and contradiction in social analysis*. Berkley and Los Angeles: University of California Press.

Giorgi, S., Lockwood, C., & Glynn, M. A. (2015). The many faces of culture: Making sense of 30 years of research on culture in organization studies. *The Academy of Management Annals, 9*(1), 1-54.

Guha, S., Grover, V., Kettinger, W. J., & Teng, J. T. C. (1997). Business process change and organizational performance: Exploring an antecedent model. *Journal of Management Information Systems, 14*(1), 119-154.

Hair, J. F. J., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (Second Edition ed.). Thousand Oaks: Sage Publications.

Hair, J. F. J., Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The use of partial least squares structual equation modeling in strategic management research: A review of past practices and recommendations for future applications. *Long Range Planning, 45*(5/6), 320-340.

Hammer, M. (2007). The process audit. *Harvard Business Review, 85*(4), 111–123.

Hammer, M. (2010). What is business process management? In J. vom Brocke & M. Rosemann (Eds.), *Handbook on business process management: Introduction, methods and information systems* (Vol. 1, pp. 3–16). Berlin / Heidelberg: Springer.

Harmon, P. (2003). *Business process change: A manager's guide to improving, redesigning, and automating processes*. San Francisco: Morgan Kaufmann Publishers.

Harmon, P. (2007). *Business process change: A guide for business managers and BPM and six sigma professionals* (2 ed.): The MK / OMG Press.

Hatch, M. J., Schultz, M., & Skov, A.-M. (2015). Organizational identity and culture in the context of managed change: Transformation in the Carlsberg Group, 2009-2013. *Academy of Management Discoveries, 1*(1), 58-90.

Holterman, R. J. (2013). *Five common pitfalls in process optimization*. Grenoble, France: Bonitasoft.

Howard-Grenville, J., Golden-Biddle, K., Irwin, J., & Mao, J. (2011). Liminality as Cultural Process for Cultural Change. *Organization Science, 22*(2), 522-539.

Hu, L.-T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*(4), 424-453.

Huang, S. Y., Huang, S.-M., & Wu, T.-H. (2009). Process efficiency of the enterprise resource planning adoption. *Industrial Management & Data Systems, 109*(8), 1085-1100.

Huq, Z., Huq, F., & Cutright, K. (2006). BPR through ERP: Avoiding change management pitfalls. *Journal of Change Management, 6*(1), 67-85.

Iivari, J., & Huisman, M. (2007). The relationship between organizational culture and the deployment of systems development methodologies. *Management Information Systems Quarterly, 31*(1), 35-58.

Indulska, M., Chong, S., Bandara, W., Sadiq, S., & Rosemann, M. (2006). *Major issues in business process management*. Paper presented at the 17th Australasian Conference on Information Systems (ACIS 2006), Adelaide, Australia.

Jesus, L., Macieira, A., Karrer, D., & Caulliraux, H. (2010). BPM center of excellence. The case of a Brazilian company. In J. vom Brocke & M. Rosemann (Eds.), *Handbook on business process management. Strategic alignment, governance, people and culture* (Vol. 2, pp. 283-303). Berlin: Springer.

Kellogg, K. C. (2011). Hot lights and cold steel: Cultural and political toolkits for practice change in surgery. *Organization Science, 22*(2), 482-502.

Kettinger, W. J., & Grover, V. (1995). Toward a theory of business process change management. *Journal of Management Information Systems, 12*(1), 9–30.

Kettinger, W. J., Teng, J. T. C., & Guha, S. (1997). Business process change: A study of methodologies, techniques, and tools. *Management Information Systems Quarterly, 21*(1), 55-80.

Khazanchi, S., Lewis, M. W., & Boyer, K. K. (2007). Innovation-supportive culture: The impact of organizational values on process innovation. *Journal of Operations Management, 25*(4), 871-884.

Kluckhohn, C. (1951). Values and value-orientations in the theory of action: An exploration in definition and classification. In T. Parsons & E. A. Shils (Eds.), *Toward a general theory of action* (pp. 388-433). Cambridge, MA: Harvard University Press.

Kueng, P. (2000). Process performance measurement system: A tool to support process-based organizations. *Total Quality Management, 11*(1), 67-85.

Kummer, T.-F., & Schmiedel, T. (2016). Reviewing the role of culture in strategic information systems research: A call for prescriptive theorizing on culture management. *Communications of the Association of Information Systems, 38*(5), 122-144.

Lacity, M. C., Khan, S. A., & Willcocks, L. P. (2009). A review of the IT outsourcing literature: Insights for practice. *Journal of Strategic Information Systems, 18*(3), 130-146.

Leidner, D. E., & Kayworth, T. (2006). A review of culture in information systems research: Toward a theory of information technology culture conflict. *Management Information Systems Quarterly, 30*(2), 357–399.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *Management Information Systems Quarterly, 35*(2), 293-334.

Majchrzak, A., Rice, R. E., Malhotra, A., & Ba, S. (2000). Technology adaptation: The case of a computer-supported inter-organizational virtual team. *Management Information Systems Quarterly, 24*(4), 569-600.

Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science, 52*(12), 1865-1883.

Mani, D., Barua, A., & Whinston, A. B. (2010). An empirical analysis of the impact of information capabilities design on business process outsourcing performance. *MIS Quarterly, 34*(1), 39-62.

Melville, N., Kraemer, K., & Gubaxani, V. (2004). Information technology and organizational performance: An integrative model of IT business value. *Management Information Systems Quarterly, 28*(2), 283-322.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192-222.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. New York: McGraw-Hill.

Parsons, T., & Shils, E. A. (1951). *Toward a general theory of action*. New Brunswick, New Jersey: Transaction Publishers.

Petter, S., Straub, D. W., & Rai, A. (2007). Specifying formative constructs in IS research. *Management Information Systems Quarterly, 31*(4), 623-656.

Porpora, D. V. (2013). Morphogenesis and social change. In M. S. Archer (Ed.), *Social Morphogenesis* (pp. 25-37): Springer.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*(4), 717-731.

Recker, J. (2014). Suggestions for then next wave of BPM research: Strengthening the theoretical core and exploring the protective belt. *Journal of Information Technology Theory and Application, 15*(2), 5-20.

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). SmartPLS 3. Retrieved from http://www.smartpls.com

Rosemann, M. (2006). Potential pitfalls of process modeling: part B. *Business Process Management Journal, 12*(3), 377-384.

Rouwenhorst, B., Reuter, B., Stockrahm, V., van Houtum, G. J., Mantel, R. J., & Zijm, W. H. M. (2000). Warehouse design and control: Framework and literature review. *European Journal of Operational Research, 122*, 515-533.

Ruževičius, J., Klimas, D., & Veleckaitė, R. (2012). Influence of organizational culture on the success of business process management in Lithuanian public sector organizations. *Current Issues of Business and Law, 7*(1), 1-16.

Sarker, S., & Lee, A. S. (2002). Using a positivist case research methodology to test three competing theories-in-use of business process redesign. *Journal of the Association for Information Systems, 2*(1), 1-72.

Savolainen, T., & Haikonen, A. (2007). Dynamics of organizational learning and continuous improvement in six sigma implementation. *The TQM Magazine, 19*(1), 6-17.

Savvas, A. (2005). Cultural resistance main cause of BPM project failure. Retrieved from http://www.computerweekly.com/Articles/2005/03/14/208863/cultural-resistance-main-cause-of-bpm-project-failure.htm

Schein, E. H. (2004). *Organizational culture and leadership* (3 ed.). San Francisco: Jossey-Bass.

Schmiedel, T., vom Brocke, J., & Recker, J. (2013). Which cultural values matter to business process management? Results from a global Delphi study. *Business Process Management Journal, 19*(2), 292-317.

Schmiedel, T., vom Brocke, J., & Recker, J. (2014). Development and validation of an instrument to measure organizational cultures' support of business process management. *Information & Management, 51*(1), 43-56.

Shachaf, P. (2008). Cultural diversity and information and communication technology impacts on global virtual teams: An exploratory study. *Information & Management, 45*(2), 131-142.

Sharma, R., Yetton, P., & Crawford, J. (2009). Estimating the effect of common method variance: The method-method pair technique with an illustration from TAM research. *Management Information Systems Quarterly, 33*(3), 473-490.

Siassakos, D., Fox, R., Crofts, J. F., Hunt, L. P., Winter, C., & Draycott, T. J. (2011). The management of a simulated emergency: Better teamwork, better performance. *Resuscitation, 82*(2), 203-206.

smartpls.com. (2018). https://www.smartpls.com/documentation/functionalities/model-fit.

Smets, M., Morris, T., & Greenwood, R. (2012). From practice to field: A multilevel model of practice-driven institutional change. *Academy of Management Journal, 55*(4), 877-904.

Snee, R. D., & Hoerl, R. W. (2003). *Leading Six Sigma: A step-by-step guide based on experience with GE and other Six Sigma companies*. Upple Sadder River, New Jersey: Financial Times Prentice Hall.

Soh, C., Kien, S. S., & Tay-Yap, J. (2000). Cultural fits and misfits: Is ERP a universal solution? *Communications of the ACM, 43*(5), 47-51.

Spanyi, A. (2010). Business process management governance. In J. vom Brocke & M. Rosemann (Eds.), *Handbook on business process management: Strategic alignment, governance, people and culture* (Vol. 2, pp. 223-238). Berlin / Heidelberg: Springer.

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement and validtion. *Academy of Management Journal, 38*(5), 1442-1465.

Spreitzer, G. M., & Doneson, D. (2005). Musings on the past and future of employee empowerment. In T. Cummings (Ed.), *Handbook of Organizational Development*. London: Sage Publishing.

Stoddard, D. B., & Jarvenpaa, S. L. (1995). Business process redesign: Tactics for managing radical change. *Journal of Management Information Systems, 12*(1), 81-107.

Suliman, A., & Iles, P. (2000). Is continuance commitment beneficial to organizations? Commitment-performacne relationship: A new look. *Journal of Managerial Psychology, 15*(5), 407-422.

Tang, J., Pee, L. G., & Iijima, J. (2013). Investigating the effects of business process orientation on organizational innovation performance. *Information & Management, 50*(8), 650-660.

Terziovski, M. (2002). Achieving performance excellence through an integrated strategy of radical innovation and continuous improvement. *Measuring Business Excellence, 6*(2), 5-14.

Trantopoulos, K., von Krogh, G., Wallin, M. W., & Woerter, M. (2017). External knowledge and information technology: Implications for process innovation performance. *Management Information Systems Quarterly*, *41*(1), 287-300.

Turetken, O., & Demirors, O. (2011). Plural: A decentralized business process modeling method. *Information & Management*, *48*(6), 235-247.

Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application, 11*(2), 5-40.

Venkatesh, V., & Bala, H. (2012). Adoption and impacts of interorganizational business process standards: Role of partnering synergy. *Information Systems Research, 23*(4), 1131-1157.

vom Brocke, J., & Sinnl, T. (2011). Culture in business process management: A literature review. *Business Process Management Journal, 17*(2), 357-377.

Weber, K., & Dacin, M. T. (2011). The cultural construction of organizational life: Introduction to the special issue. *Organization Science, 22*(2), 287-298.

Wieder, B., Booth, P., Matolcsy, Z. P., & Ossimitz, M.-L. (2006). The impact of ERP systems on firm and business process performance. *Journal of Enterprise Information Management*, *19*(1), 13-29.

Willcocks, L., & Smith, G. (1995). IT-enabled business process reengineering. *The Journal of Strategic Information Systems, 4*(3), 279–301.

Žabajek, D., Kovačič, A., & Štemberger, M. I. (2009). The influence of business process management and some other CSFs on successful ERP implementation. *Business Process Management Journal*, *15*(4), 588-608.

Zairi, M. (1997). Business process management: A boundaryless approach to modern competitiveness. *Business Process Management Journal*, *3*(1), 64–80.

Zelt, S., Recker, J., Schmiedel, T., & vom Brocke, J. (2018). Development and validation of an instrument to measure and manage organizational process variety. *PLOS ONe, 13*(10), e0206198.

Zelt, S., Recker, J., Schmiedel, T., & vom Brocke, J. (2019). A theory of contingent business process management. *Business Process Management Journal, doi:10.1108/BPMJ-1105-2018-0129*.

Zeuner, L. (2003). *Cultural sociology from concern to distance*. Denmark: Copenhagen Business School Press.

Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: the influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of Management Journal, 53*(1), 107–128.

Zhao, X., Lynch Jr., J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37*(August), 197-206.

Zucchi, F., & Edwards, J. S. (1999). Human resource management aspects of business process reengineering: A survey. *Business Process Management Journal, 5*(4), 325-344.

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Appendix

Appendix A. BPM culture measurement instrument (Schmiedel et al., 2014)

Subconstruct	Indicator	Item
C_e (proactive and responsive attitude toward the needs of external process output recipients)	**C_e_1**	The core business processes of our organization are focused on satisfying our customers.
	C_e_2	Our organization incorporates customer expectations into its business processes.
	C_e_3	Our organization uses customer complaints as an opportunity to reflect on the redesign of business processes.
	C_e_4	Our organization includes our customers in the design of our business processes.
	C_e_5	Our organization understands the processes of our customers that lead to an interaction with our organization.
C_i (proactive and responsive attitude toward the needs of internal process output recipients)	**C_i_1**	Our organization defines internal customers for all business processes.
	C_i_2	Employees of our organization focus on the requirements of colleagues who receive their work.
	C_i_3	Employees of our organization have a good understanding of who their internal customers are.
	C_i_4	Managers of our organization encourage employees to meet the needs of colleagues who receive their work.
	C_i_5	Employees treat people within our organization as customers when providing them with internal services.
E_ci (orientation toward continuous improvement to achieve superior process performance)	**E_ci_1**	Our organization regularly evaluates its business processes for improvement opportunities.
	E_ci_2	Employees of our organization strive to improve our business processes continually.
	E_ci_3	Our organization regularly implements best practices that improve business processes.
	E_ci_4	Managers of our organization regularly invite ideas from our employees on ways to improve business processes.
	E_ci_5	Our organization regularly uses performance indicators to find ways to improve business processes.
E_i (orientation toward innovation to achieve superior process performance)	**E_i_1**	Team leaders in our organization honor cutting-edge ideas for the innovation of business processes.
	E_i_2	Our top management rewards employees who present pioneering ideas for enhancing the performance of business processes.
	E_i_3	Our organization welcomes concepts for fundamental innovations that increase the performance of business processes.
	E_i_4	Our organization encourages thinking “outside the box” to create innovative solutions in business processes.
	E_i_5	Managers of our organization are open to radical changes that enhance the performance of business processes.
R_a (accountability for process decisions)	**R_a_1**	Process owners of our organization have the authority to make decisions on business processes.
	R_a_2	Managers of our organization are rewarded based on the performance of the overall business processes for which they are responsible.
	R_a_3	Responsibilities for business processes are clearly defined among members of our management board.
	R_a_4	Process owners of our organization are accountable for the performance of business processes.

R_a_5	Our organization appoints process owners for all business processes.

R_c (commitment to process objectives)	**R_c_1**	Employees of our organization go above and beyond their formally defined responsibilities to achieve the objectives of business processes.
	R_c_2	Our organization highly values personal dedication to reaching performance targets of business processes.
	R_c_3	It motivates employees of our organization that their actions contribute to the achievement of business process objectives.
	R_c_4	Our organization uses current achievements to encourage employees' commitment to process objectives.
	R_c_5	Employees of our organization feel an inner obligation to attain the performance goals of business processes.
T_f (positive attitude toward formal cross-functional collaboration)	**T_f_1**	Our organization properly aligns the goals of the departments that are involved in one business process.
	T_f_2	Managers of our organization routinely arrange cross-departmental meetings to discuss current topics of business processes.
	T_f_3	The overall goals of a business process in our organization are binding on all departments involved in that particular business process.
	T_f_4	Our organization does well in coordinating the tasks of the departments that are involved in one business process.
	T_f_5	It is the policy of our organization that employees share their process knowledge with those in other departments.
T_i (positive attitude toward informal cross-functional collaboration	**T_i_1**	Employees of our organization enjoy working with their process colleagues from other departments.
	T_i_2	Employees of our organization have many opportunities for informal interaction with their process colleagues from other departments.
	T_i_3	Employees of our organization not only identify with their department but also with their process team.
	T_i_4	Employees of our organization informally exchange information about current topics in business processes.
	T_i_5	Our organization encourages informal activities that break down departmental barriers.

Appendix B. Process performance measurement

For developing the measures of the process performance construct, we followed two major steps of established scale development procedures (MacKenzie et al., 2011; Moore & Benbasat, 1991), that is, literature-based item development to create a first pool of content-valid items and index card sorting to refine this pool of items and assess construct validity. First, we created a set of initial items based on extant literature that covers process performance, efficiency, and effectiveness (e.g., Coenen, von Felten, & Schmid, 2011; Huang, Huang, & Wu, 2009; Kueng, 2000). We developed ten items that either focused on process efficiency or process effectiveness. Second, we performed an index card sorting test with four times four BPM experts from academia and industry (i.e., eight academics and eight practitioners working in the field of BPM). The experts had to sort the ten items we developed for the process performance construct into categories, so as to see how far efficiency and effectiveness are valid subconstructs of the measurement instrument. Two of the four groups were given no categories and had to sort items with similar meaning into the same category, while the other two groups had to sort the items into the two subconstruct categories: efficiency and effectiveness. We integrated the feedback we received and iteratively revised the items after each sorting round. We, then, pretested the items with ten further people working in the field of BPM (i.e., manager, process expert, and researcher). In individual meetings, we asked them to think of a particular process and evaluate its performance with the scale we developed. We also asked the participants to provide us with direct feedback on the scale while applying the measurement instrument. The notes we took during these sessions helped us to iteratively improve the understandability of the measurement scale. We continuously adjusted the items where further clarity was needed. The final set of items is listed in Table 5.

Appendix C. Indicator loadings and cross-loadings

	CO_e	CO_i	E_ci	E_i	R_a	R_c	T_f	T_i	Effec	Effic	Probability of loadings
C_e1	0.83	0.46	0.51	0.54	0.48	0.49	0.50	0.51	0.47	0.42	p < 0.001
C_e2	0.90	0.54	0.57	0.60	0.54	0.54	0.59	0.55	0.58	0.53	p < 0.001
C_e3	0.86	0.55	0.58	0.60	0.50	0.52	0.56	0.57	0.52	0.53	p < 0.001
C_e4	0.79	0.56	0.54	0.53	0.56	0.51	0.54	0.51	0.52	0.47	p < 0.001
C_e5	0.84	0.56	0.58	0.62	0.57	0.58	0.57	0.59	0.57	0.53	p < 0.001
C_i1	0.51	0.82	0.63	0.63	0.56	0.57	0.65	0.56	0.56	0.51	p < 0.001
C_i2	0.55	0.88	0.66	0.65	0.55	0.68	0.67	0.67	0.60	0.56	p < 0.001
C_i3	0.58	0.90	0.62	0.61	0.54	0.62	0.64	0.55	0.58	0.50	p < 0.001
C_i4	0.60	0.90	0.67	0.70	0.62	0.74	0.72	0.71	0.65	0.59	p < 0.001
C_i5	0.52	0.88	0.66	0.63	0.52	0.68	0.66	0.61	0.61	0.57	p < 0.001
E_ci1	0.58	0.59	0.87	0.62	0.59	0.55	0.63	0.57	0.63	0.57	p < 0.001
E_ci2	0.59	0.63	0.87	0.68	0.57	0.63	0.63	0.66	0.64	0.58	p < 0.001
E_ci3	0.54	0.62	0.83	0.57	0.57	0.53	0.57	0.53	0.58	0.54	p < 0.001
E_ci4	0.56	0.64	0.82	0.68	0.61	0.69	0.67	0.70	0.62	0.57	p < 0.001
E_ci5	0.52	0.65	0.84	0.59	0.65	0.61	0.62	0.58	0.65	0.60	p < 0.001
E_i1	0.60	0.64	0.61	0.83	0.58	0.62	0.65	0.66	0.58	0.54	p < 0.001
E_i2	0.47	0.53	0.59	0.80	0.46	0.53	0.51	0.52	0.48	0.46	p < 0.001
E_i3	0.62	0.64	0.68	0.92	0.62	0.71	0.70	0.69	0.61	0.57	p < 0.001
E_i4	0.63	0.70	0.68	0.93	0.60	0.73	0.72	0.73	0.60	0.58	p < 0.001
E_i5	0.62	0.65	0.63	0.82	0.60	0.67	0.66	0.62	0.62	0.58	p < 0.001
R_a1	0.53	0.54	0.57	0.57	0.84	0.60	0.60	0.63	0.58	0.51	p < 0.001
R_a2	0.49	0.48	0.58	0.52	0.77	0.55	0.58	0.48	0.54	0.55	p < 0.001
R_a3	0.47	0.53	0.57	0.57	0.84	0.52	0.65	0.54	0.57	0.54	p < 0.001
R_a4	0.62	0.59	0.64	0.61	0.87	0.61	0.70	0.60	0.67	0.59	p < 0.001
R_a5	0.47	0.47	0.54	0.47	0.81	0.46	0.56	0.51	0.52	0.50	p < 0.001
R_c1	0.49	0.56	0.56	0.57	0.52	0.82	0.59	0.68	0.56	0.51	p < 0.001
R_c2	0.59	0.70	0.63	0.71	0.64	0.90	0.73	0.69	0.65	0.58	p < 0.001
R_c3	0.57	0.71	0.65	0.72	0.62	0.92	0.70	0.68	0.68	0.61	p < 0.001
R_c4	0.60	0.74	0.66	0.73	0.61	0.90	0.75	0.68	0.69	0.63	p < 0.001
R_c5	0.53	0.60	0.63	0.62	0.57	0.89	0.62	0.63	0.64	0.58	p < 0.001
T_f1	0.62	0.70	0.66	0.69	0.67	0.63	0.88	0.65	0.63	0.62	p < 0.001
T_f2	0.51	0.58	0.57	0.58	0.57	0.58	0.85	0.60	0.59	0.57	p < 0.001
T_f3	0.55	0.64	0.63	0.65	0.66	0.66	0.88	0.62	0.63	0.60	p < 0.001
T_f4	0.59	0.68	0.68	0.64	0.69	0.69	0.89	0.69	0.68	0.64	p < 0.001
T_f5	0.59	0.71	0.66	0.73	0.68	0.78	0.86	0.76	0.63	0.59	p < 0.001
T_i1	0.59	0.63	0.66	0.68	0.59	0.65	0.68	0.88	0.61	0.59	p < 0.001
T_i2	0.49	0.55	0.53	0.58	0.54	0.63	0.63	0.86	0.49	0.48	p < 0.001
T_i3	0.59	0.65	0.63	0.65	0.58	0.67	0.64	0.88	0.58	0.57	p < 0.001
T_i4	0.56	0.58	0.66	0.62	0.58	0.67	0.66	0.85	0.59	0.58	p < 0.001
T_i5	0.54	0.60	0.59	0.68	0.58	0.62	0.66	0.79	0.53	0.53	p < 0.001
Effec1	0.51	0.56	0.59	0.55	0.55	0.60	0.58	0.53	0.88	0.75	p < 0.001
Effec2	0.62	0.67	0.67	0.65	0.63	0.64	0.67	0.64	0.85	0.70	p < 0.001
Effec3	0.56	0.59	0.66	0.61	0.63	0.70	0.64	0.60	0.91	0.75	p < 0.001
Effec4	0.58	0.65	0.74	0.61	0.70	0.68	0.72	0.64	0.88	0.73	p < 0.001

Effec5	0.50	0.53	0.57	0.52	0.56	0.57	0.59	0.49	0.86	0.80	$p < 0.001$
Effic1	0.60	0.61	0.67	0.61	0.65	0.62	0.66	0.60	0.85	0.87	$p < 0.001$
Effic2	0.51	0.51	0.60	0.55	0.57	0.56	0.62	0.54	0.77	0.88	$p < 0.001$
Effic3	0.47	0.51	0.51	0.52	0.50	0.52	0.55	0.52	0.66	0.85	$p < 0.001$
Effic4	0.51	0.53	0.57	0.53	0.59	0.57	0.59	0.55	0.72	0.89	$p < 0.001$
Effic5	0.50	0.56	0.59	0.57	0.54	0.62	0.60	0.59	0.70	0.89	$p < 0.001$

Appendix D. Analysis of control variables in cross-sectional data

Table D.1

Influence of control variables on PP construct in cross-sectional data set

	Beta coefficients	Statistical probability
Automotive industry -> PP	-0.04	0.405
Banking & financial services industry -> PP	0.10	0.093
Communications & media industry -> PP	-0.06	0.138
Consultancy industry -> PP	-0.07	0.178
Consumer goods industry -> PP	0.00	0.937
Engineering & construction industry -> PP	-0.01	0.819
Information technology industry -> PP	-0.04	0.529
Logistics & transportation industry -> PP	0.02	0.693
Firm size -> PP	-0.12	0.026
Internationality -> PP	0.04	0.364

Table D.2

Influence of control variables on PP construct in cross-sectional data subsets by industries

	Firm size -> PP		Internationality -> BPMC	
	Beta coefficients	Statistical probability	Beta coefficients	Statistical probability
Automotive	0.26	0.284	0.13	0.516
Banking & financial services	-0.15	0.410	-0.10	0.312
Communications & media	-0.25	0.263	0.08	0.673
Consultancy	0.13	0.256	-0.11	0.264
Consumer goods	-0.08	0.512	-0.08	0.538
Engineering & construction	-0.08	0.489	0.02	0.853
Information technology	-0.31	0.005	0.26	0.019
Logistics & transportation	0.16	0.674	-0.18	0.600
Public services	-0.05	0.621	n/a	n/a

Appendix E. Post-hoc analysis: Evaluating alternative structural models

We assessed various alternative structural models for the cross-sectional data set to gain a deeper understanding of the variable relations in our study.

First, we examined a model on the M -> PP relation with BPM culture as a moderator variable. The results suggest that a model including a moderating effect of BPMC shows no good fit to the data. Thus, we continued our analysis of BPMC as a mediating variable.

Second, we calculated two further alternative structural models which both focused on subconstruct levels of our original structural model. That is, we changed the original model in that we first replaced BPMC by its subconstructs C (customer orientation), E (excellence), R (responsibility), and T (teamwork) in a model that we refer to as *BPMC subconstruct model*; and later, we additionally replaced M by its subconstructs OLM (operational level methods), TLM (tactic level methods), and SLM (strategic level methods) in a model that we refer to as *BPMC+M subconstructs model*. Table E.1 summarizes results from the analysis of the single variable relations, and Table E.2 summarizes results from the analysis of mediating relations.

Regarding the BPMC subconstruct model, the cultural subconstructs do not fully mediate the M -> PP relation as does BPMC in the original model. Only R partially mediates the relation with a VAF value of 0.37. Yet, R does not largely contribute to explaining the variance of PP; instead, it only has a small effect with an f^2 value of 0.073.

Regarding the BPMC+M subconstructs model, the cultural subconstructs do not mediate the relation between BPM methods (at the operational, tactic, and strategic level) and process performance. The relation R → PP was the only cultural subconstruct–PP association with low statistical probability but the effect size is negligible with a value of 0.08.

Both subconstruct models seem to be limited with regard to their ability to explain the mediating role of BPMC in the M -> PP relation on a more fine-granular level. To further assess the appropriateness of the subconstruct models, we compared model fit indices of the original model and the subconstruct models.

Table E.1

Subconstruct models

BPMC subconstruct model				BPMC+M subconstructs model			
Relation	**Coefficients**	**p**	**f^2**	**Relation**	**Coefficients**	**p**	**f^2**
M -> C	0.619	< 0.001	0.623	OLM -> C	0.357	< 0.001	0.130
M -> E	0.665	< 0.001	0.793	OLM -> E	0.361	< 0.001	0.146
M -> R	0.630	< 0.001	0.657	OLM -> R	0.361	< 0.001	0.136
M -> T	0.596	< 0.001	0.552	OLM -> T	0.309	< 0.001	0.093
C -> PP	0.112	0.155	0.009	TLM -> C	0.017	0.779	0.000
E -> PP	0.168	0.046	0.016	TLM -> E	0.097	0.112	0.011
R -> PP	0.349	< 0.001	0.073	TLM -> R	0.026	0.660	0.001
T -> PP	0.156	0.098	0.014	TLM -> T	0.073	0.225	0.006
M -> PP	0.104	0.046	0.017	SLM -> C	0.341	< 0.001	0.124
				SLM -> E	0.331	< 0.001	0.129
				SLM -> R	0.341	< 0.001	0.127
				SLM -> T	0.321	< 0.001	0.105
				C -> PP	0.127	0.109	0.012
				E -> PP	0.15	0.069	0.013
				R -> PP	0.363	< 0.001	0.080
				T -> PP	0.147	0.104	0.012
				OLM -> PP	0.048	0.326	0.004
				TLM -> PP	0.111	0.024	0.025
				SLM -> PP	-0.012	0.796	0.000

Table E.2

Mediation analysis

BPMC subconstruct model				BPMC+M subconstructs model			
Relation	**Specific indirect effects**	**p**	**VAF**	**Relation**	**Specific indirect effects**	**p**	**VAF**
M -> C -> PP	0.069	0.160	0.12	OLM -> C -> PP	0.045	0.135	0.14
M -> E -> PP	0.112	0.050	0.19	OLM -> E -> PP	0.054	0.086	0.17
M -> R -> PP	0.220	< 0.001	0.37	OLM -> R -> PP	0.131	0.002	0.40
M -> T -> PP	0.093	0.105	0.16	OLM -> T -> PP	0.045	0.129	0.14
				TLM -> C -> PP	0.002	0.808	0.01
				TLM -> E -> PP	0.014	0.280	0.09
				TLM -> R -> PP	0.010	0.674	0.07
				TLM -> T -> PP	0.011	0.392	0.07
				SLM -> C -> PP	0.043	0.129	0.17
				SLM -> E -> PP	0.050	0.086	0.20
				SLM -> R -> PP	0.124	0.001	0.49
				SLM -> T -> PP	0.047	0.124	0.19

Although the applicability of model fit measures to PLS-SEM is controversial (Hair et al., 2017), several indices are commonly used to assess model fit in PLS-SEM research, such as the standardized root-mean-squared residual (SRMR), the unweighted least squares discrepancy (d_ULS), and the geodesic discrepancy (d_G) (Benitez, Castillo, Llorens, & Braojos, 2018; Benitez, Llorens, et al., 2018).

Regarding SRMR, values lower than 0.080 are used as an indication for good model fit (Hu & Bentler, 1998). Table E.3 shows that our original structural model reveals SRMR values below 0.080 whereas the estimated models of the subconstruct models do not. Regarding d_ULS and d_G, original values need to lie within the confidence interval of the sampling distribution to indicate good model fit (smartpls.com, 2018). Our data show that this criterion is met for the original model, as no value exceeds the upper bound 97.5% confidence level (CL). Yet, for the subconstruct models, the values of the estimated models exceed this level.

Table E.3

Model fit analysis

	Original model			**BPMC subconstruct model**			**BPMC+M subconstructs model**		
	Value	2.5% CL	97.5% CL	Value	2.5% CI	97.5% CI	Value	2.5% CI	97.5% CI
SRMR									
Saturated Model	0.013	0.001	0.015	0.012	0.005	0.016	0.000	0.000	0.000
Estimated Model	0.013	0.001	0.015	0.201	0.015	0.034	0.201	0.008	0.027
d_ULS									
Saturated Model	0.002	0.000	0.003	0.005	0.001	0.009	0.000	0.000	0.000
Estimated Model	0.002	0.000	0.003	1.459	0.008	0.041	1.456	0.002	0.026
d_G1									
Saturated Model	0.006	0.000	0.008	0.011	0.002	0.021	0.000	0.000	0.000
Estimated Model	0.006	0.000	0.008	0.736	0.005	0.024	0.730	0.001	0.015
d_G2									
Saturated Model	0.004	0.000	0.006	0.008	0.002	0.015	0.000	0.000	0.000
Estimated Model	0.004	0.000	0.006	0.666	0.005	0.022	0.658	0.001	0.012